GOULD

P/N M11-4183-03

5900 CARD CAGE - ALL MODELS

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GOULD
Electronics

MANUAL PART NO.
M11-4183-03

GOULD 5900 CARD CAGE
ALL MODELS
OPERATING AND SERVICE MANUAL

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Compliance with the above procedure will assure the earliest repair and return of your equipment.

The following information is intended to alert the user to possible dangers and important information contained in this manual. The "WARNINGS" and "CAUTIONS" do not eliminate the dangers that they signal. Close attention to the information supplied plus "common sense" operation are the major accident prevention measures.

WARNING:	**Failure to follow this warning may result in bodily injury.**

CAUTION:	**Failure to follow this caution may result in possible damage to the product or equipment.**

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SECTION I

GENERAL INFORMATION

1.1 SCOPE OF MANUAL

This manual contains operating and installation instructions for the Gould 5900 Signal Conditioner Frame (P/N CL-810231 OR CL-810232) and associated accessory kits. Descriptive information and specifications are also included, as are sections covering service, maintenance, theory of operation, and parts identification.

For service and repair information contact your local Gould representative at the nearest location listed in the front of this manual.

1.2 DESCRIPTION

The 5900 Signal Conditioner frame is of modular design to facilitate production of a family of products. Both the CL-810232 (standard frame) and CL-810231 (premium frame) were designed for both the 4600 and 5600 line of signal conditioners; however, only the premium frame will support the 5600 with status option or 5600 programmable signal conditioners. The premium frame provides forced air cooling required by the 5600 programmable signal conditioners. Both frames are designed so signal conditioners are retained and removed by an ejector from the front panel.

The 5900 frame provides signal conditioner outputs via individual BNC connectors or Medical Output board. It is also supplied with an additional BNC connector for a sync clock input. From the Medical Output board, it makes available all the medical and auxiliary analog output signals from each individual signal conditioner.

This frame has been designed to "nest" on top of Gould's 3600, 3800, or TA2000 chart recorders or the Gould 5300 waveform recorder. It is offered in a portable or rack mounted version.

The 5900 has a proprietary board, Recorder Interface board, which can be connected to any 3000 series recorder via the 5900/3000 cable. The 3 ft. CL-311222-1 or the 6 ft. CL-311222-2 cable assembly options makes this connection complete. The Recorder Interface board passes all the signal conditioner's recorder-output signals over to the recorder. With the Interpreter Board option and the appropriate signal conditioner configuration (5600 with status board option), this interface also passes signal conditioner status information to be printed on the recorder's chart, interchannelly.

All operations of the signal conditioners can be done manual via their front panel controls. With the 5600 programmable amplifiers, the premium frame adds the versatility of remote control from a computer terminal when configured with the Interpreter Board option and the RS-232C or IEEE-488 option kits. Remote control is also possible without the RS232C or IEEE-488 option kits, via the Recorder Interface board; however, in this case, the recorder must have RS-232 or IEEE-488 options.

The RS-232C and the IEEE-488 Interface options to the 5900 include the Interpreter board.

1.3 SPECIFICATIONS

PHYSICAL CHARACTERISTICS (chassis only)

DIMENSIONS:

WIDTH	19.0" (482.6 mm)
HEIGHT	7.0" (177.8 mm)
DEPTH	18.0" (457.20 mm)
WEIGHT	19.0 lbs. (8.62 Kg)
FINISH	2 tone corporate gray
MOUNTING	Rack or Portable
VENTILATION:	
CL-810232 CHASSIS	(1) 25 CFM, minimum, fan for power supply cooling
CL-810231 CHASSIS	(1) 25 CFM, minimum, fan for power supply cooling and (4) 20 CFM, minimum, fans for amplifier cooling. One per every two channels.
SIGNAL CONDITIONER RETENTION	Front panel amplifier retention with ejector and locking screw. One per channel.

1.4 ACCESSORIES

Interpreter Board Kit	11-4221-01
RS-232C Interface Kit	11-4221-03
IEEE-488 Interface Kit	11-4221-04
Recorder Interface Kit	11-4221-06
Digital I/O Board Kit	11-4221-05
Auxiliary Analog Board Kit	11-4221-02
Line Fuses:	
@ 115 VAC	116198-13
@ 230 VAC	116198-11
Slot Fuses	102625-7

SECTION II

INSTALLATION

2.1 INTRODUCTION

This section describes initial inspection checks and installation procedures for the Gould 5900 Signal Conditioner Frame.

2.2 INITIAL INSPECTION

Prior to attempting any electrical connections or operation, visually examine the signal conditioner frame for broken or loose panels, dented or nicked panels and broken or chipped rear input connectors. Make sure you read the Concealed Damage Card (Form No. 222640) which is enclosed in the shipping carton.

2.3 POWER REQUIREMENTS

The 5900 series frame can operate at voltages from 90 to 132 VAC by selecting "115" or 180 to 264 VAC by selecting "230". If the input voltage selector is changed, you must also change the line fuse (see Section 5.2 for details). For the "115" selector, a 250 VAC 3.0 amp fuse (P/N 116198-13) is used and for the "230" selector, a 250 VAC 1.5 amp fuse (P/N 116198-11) is used. The current selection is displayed in a window just above the line cord.

2.4 ENVIRONMENTAL REQUIREMENTS

Operating Temperature	0 to 50 degrees celsius
Storage Temperature	-40 t +70 degrees celsius
Humidity	10% to 90% relative humidity at 65 degrees Fahrenheit, non-condensing
Shock and Vibration	IEC-348 Section 11.3
Static Insensitivity	IEC Class 2

2.5 AMPLIFIER INSTALLATION

2.5.1 Insertion

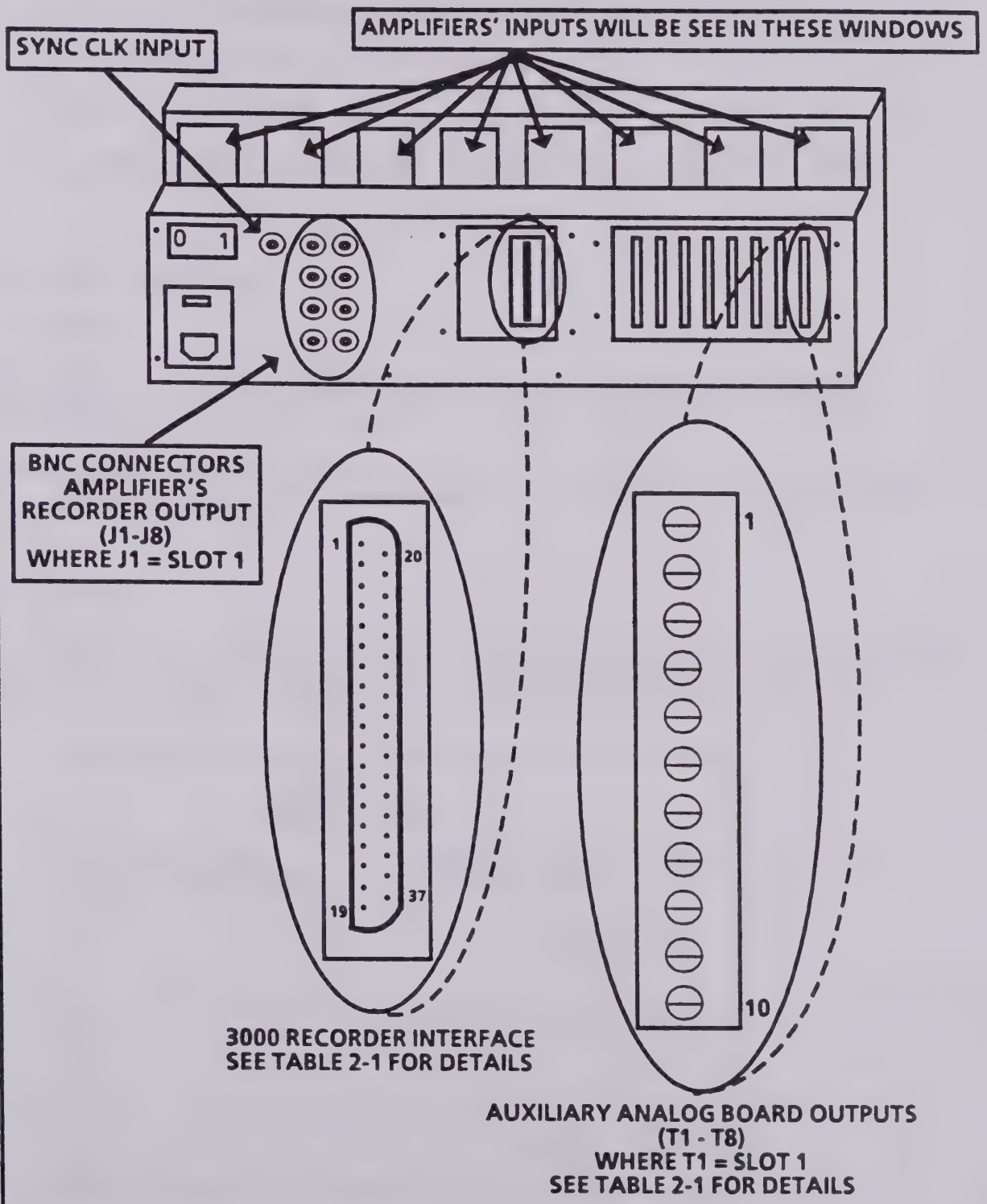
The following is the procedure to insert a signal conditioner into its appropriate slot:

a. Unscrew ejector screw and slide ejector out as far as it will go.

b. Slide the signal conditioner into the slot until the conditioner's front panel is flush with the 5900 front plate.

CAUTION: DO NOT FORCE THE SIGNAL CONDITIONER INTO THE SLOT. YOU MAY HAVE RESISTANCE BECAUSE THE CONDITIONER'S CARD EDGE CONNECTOR IS NOT ALIGNED WITH THE BACK SLOT OF THE 5900 FRAME. TO LINE THEM UP JIGGLE THE AMPLIFIER.

FIGURE 2-1
5900 FRAME - (REAR VIEW)



c. Tighten ejector screw.

2.5.2 Removal

The following is the procedure to remove a signal conditioner:

a. Disconnect the input signal connector.

b. Unscrew ejector screw.

c. To remove the conditioner pull on the ejector. This will push the conditioner out enough for you to pull it out by hand.

2.6 SIGNAL CONNECTIONS

2.6.1 Input

NOTE: In most cases, a special connector is provided with the signal conditioner for signal input connections. See the particular conditioner manual for the proper part number.

Connections to the conditioner are made at the rear of the frame (see Figure 2-1). See the signal conditioner manual for instructions on connections and types of cable to use.

2.6.2 Output

The conditioner's recorder output signals are located in the rear of the 5900 frame. They are the BNC connectors J1 thru J8 (J1 is for slot 1, etc.). Other output pins from the conditioner are available via the Medical Board kit (see Figure 2-1 and Table 2-1 for details).

TABLE 2-1
MEDICAL BOARD

MEDICAL BOARD (T1-T8) SCREW NUMBER	AMPLIFIER 16-PIN CARD EDGE CONNECTOR
1	2 (CHA RECORDER OUT)
2	A CHB common
3	B CHB out
4	C CHA alarm High
5	D CHA alarm low
6	E CHA alarm com.
7	F CHB alarm Hig
8	H CHB alarm low
9	J ~~CHA~~ CHB alarm com.
10	5 (SIGNAL COMMON CHA)

FIGURE 2 - 2
RACK MOUNT KIT

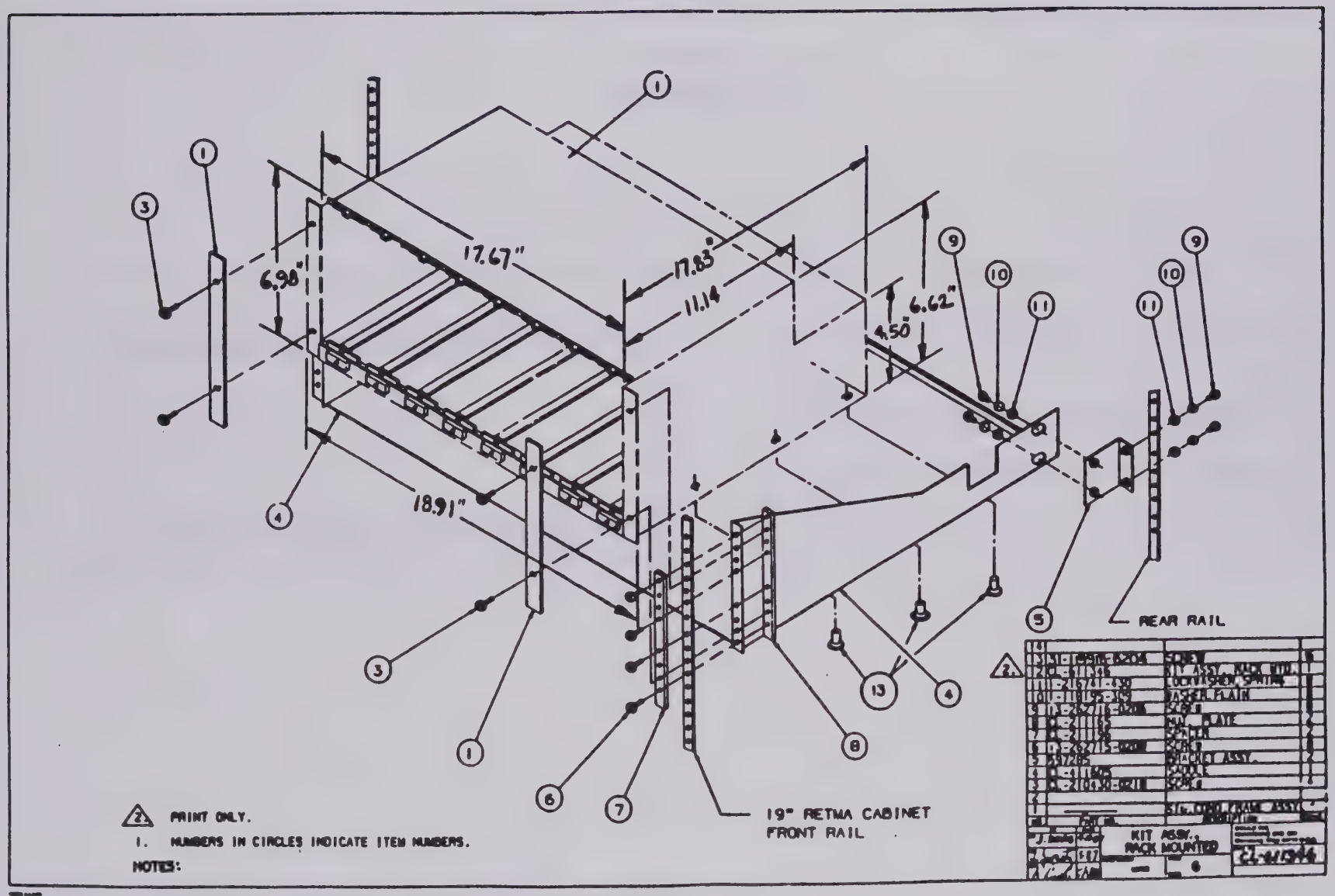
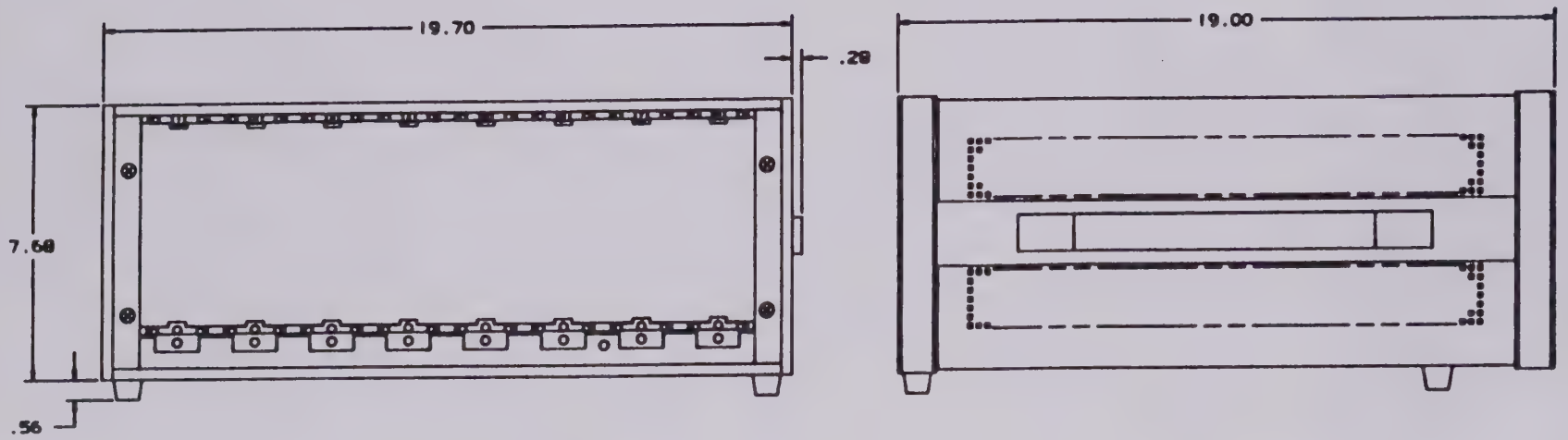


FIGURE 2-3
PORTABLE KIT



SECTION III

OPERATION

There are no operator controls for the Gould 5900 frame. If you have the Interpreter Board kit option you will have Appendix B to refer to for remote software commands. For operating instructions on signal conditioners used refer to the conditioner's manual. The power switch is located in the rear. When the frame is on, the pilot light (green LED), which is located in the front of the frame, will be lit.

SECTION IV

THEORY OF OPERATION

4.1 INTRODUCTION

This section will explain the electronic operation of the Gould 5900 Signal Conditioner Frame.

4.2 GENERAL

The 5900 Signal Conditioner Frame can be basically thought of as a "cardcage" for the 4600 and 5600 line of signal conditioners. It accepts up to 8 signal conditioners, provides their power, and provides various types of standard and optional I/O for their interfacing.

The frame consists of a mechanical "cage", that is either enclosed by a portable case or secured to a "saddle" for rack mounting. This cage basically contains 3 sections: the power supply section, the signal and power distribution section, and the cooling section. Refer to the system schematic, CL-211476, for the following explanation.

4.3 ELECTRONIC OPERATION

The power supply section consists primarily of 2 main supplies, an AC supply and a DC supply. Line power enters the 5900 through the AC cable assembly. This assembly contains the power entry module, the line filter, the line fuse, and the input voltage selector. Line power enters the power entry module, from the line cord, and passes through the line filter. The filter has been selected to suppress RFI noise with minimum 50/60 hertz leakage. One side of the line, 115 HOT, then passes through the fuse. A single 3A fuse is configured for LO AC operation and a 1.5A fuse is configured for HI AC operation. Both sides of the line are then switched "ON" or "OFF" by a DPST rocker switch. The power is the switched by a voltage selector. Select "230" on the cam for HI AC operation. The power then enters the distribution board assembly through a 5 wire molex connector. A green wire from the power entry module connects the earth ground from the line cord to the chassis at the MT1 on the Distribution Board assembly.

On the distribution board assembly, the AC power goes to 2 places - the primaries of the transformer assembly and the line section of the switching supply. The transformer's secondaries, which provide 13 VAC for each channel on separate windings, are then passed through to the distribution board assembly. On this assembly, one side of each 13 VAC winding is fused. Each fuse is rated at 1A 250 VAC. The 13 VAC taps are then passed on through the distribution board assembly to the mother board assembly where they are delivered to the conditioners on pins 7 and 8 of connectors J11-J18.

The switcher's input is capable of receiving HI and LO AC line voltages. A 2 wire cable from the switcher differentiates the HI and LO voltage selection. These wires need to be shorted together for LO AC line voltages and opened for HI AC line voltages. The shorting or opening of these wires is done automatically by the Power Entry Module. The switcher provides 3 DC outputs: +5, +15 and -15. These outputs are passed to the distribution board. From there, they are passed to where they are use throughout the system.

The distribution board assembly also provides I/O for additional option kits specified in Section I.

All grounds in the 5900 are treated as one. The ground plane inside the distribution board assembly acts as a single node for their connection. Power grounds from the supply, signal grounds from the signals conditioners and I/O, and chassis and earth grounds are all connected there.

The analog outputs from the signal conditioners can be obtained via the BNC connectors, J1 thru J8, located on the rear panel of the 5900. These signals are taken directly from pins 2 and 5 in the cardedge connectors. These connectors are considered the standard I/O and are made up of 8 cable assemblies.

SECTION V

MAINTENANCE

5.1 INTRODUCTION

This section contains information on preventive maintenance, fuse replacement, calibration, troubleshooting and subassembly replacement.

5.2 OPERATIVE MAINTENANCE

This section involves fuse replacement and input voltage changes. The 5900 frame has 2 fuse sections - AC line fuse and individual slot fuses.

WARNING: TO PREVENT THE POSSIBILITY OF SHOCK HAZARD, ALWAYS BE CERTAIN THE POWER CORD IS DISCONNECTED.

5.2.1 AC Line Fuse/Voltage Selector Change

The AC line fuse is located inside the Power Entry module which is located in the rear of the frame. There are 2 types of fuses for this module. The type of fuse used depends on what is displayed on the Input Voltage selector, which is also located in the Power Entry module (see Section 2.3 for fuse type needed). To replace the fuse (and change Voltage Selector) follow the procedure listed below:

a. Make sure frame switch is turned off and the power cable is removed.

b. Open the Power Entry module by gently prying, with a flat head screw driver, the top of the module's face plate away from the rest of the module. The tip of the screw driver should be mounted in the nitch on top of the module. After prying, the face plate will swing downward.

c. When the module is opened, you will see a fuse housing (has an arrow on it). To remove the housing gently pull outward.

d. Remove old fuse from housing and replace it with a new fuse.

   Note: If fuse is being changed because of changes in line voltage, you must also change the Voltage Selector. To change the Voltage Selector you must remove it from the Power Entry Module, turn it until the new voltage is displayed, and then insert it back it the module.

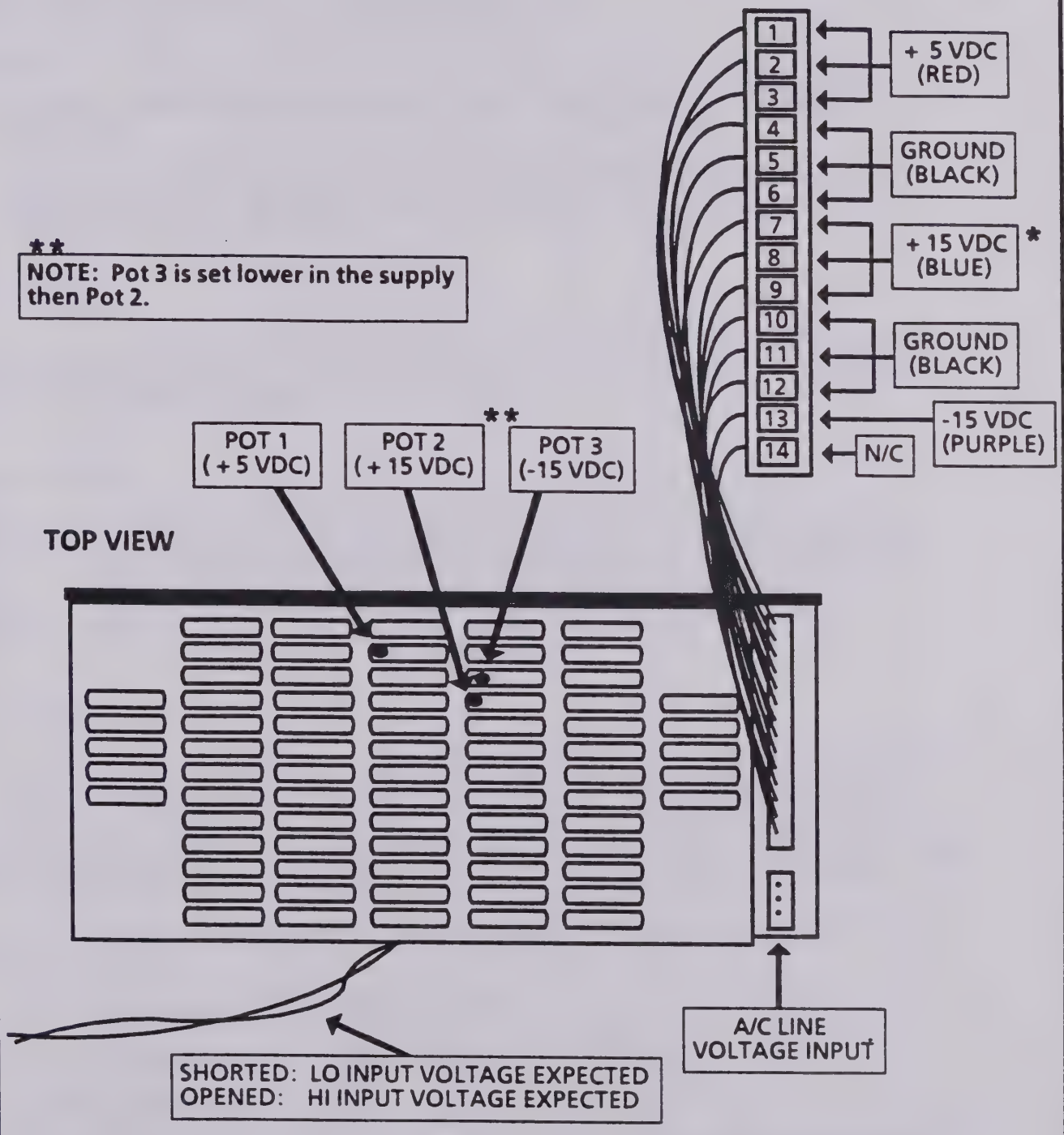
e. Insert fuse housing back into the module.

f. Close module's face plate.

5.2.2 Individual Slot Fuses

On the distribution board assembly, there are 8 fuses. Each slot has a fuse running between it and the 13 VAC coming from the transformer. These fuses are rated at 1A 250 VAC. To replace a fuse you must first remove the top-rear panel (see Section 2.6 for details). If you are facing the front of the frame,

FIGURE 5-1
SWITCHER POWER SUPPLY



* In early models, the + 15 VDC wires (3 blues) were replaced by one blue wire and a diode. Now, diode is inside supply.

they will be located on the right of the transformer. To avoid shock hazards make sure power cable has been removed.

5.3 PREVENTIVE MAINTENANCE

Preventive maintenance is limited to cleaning only.

CAUTION:

1. **BEFORE ATTEMPTING TO CLEAN THE 5900 FRAME, TURN POWER OFF AND REMOVE POWER PLUG.**

2. **AVOID USE OF CHEMICAL CLEANING AGENTS WHICH MIGHT DAMAGE PLASTIC OR PRINTED SURFACES. DO NOT USE CHEMICALS WHICH CONTAIN TOLUENE, CELLUSOLVE, ACETONE OR SIMILAR SOLVENTS.**

5.3.1 Exterior

Remove loose dust with a soft cloth or small paint brush. Dirt which remains can be removed with a soft cloth dampened in mild detergent and water solution. **DO NOT USE ABRASIVE CLEANERS.**

5.3.2 Interior

Dust in the interior should be removed occasionally due to its electrical conductivity under high humidity conditions. Blow off accumulated dust with dry, low pressure air. Remove any dirt which remains with a soft paint brush or a soft cloth dampened in mild detergent and water solution. Use a cotton-tipped applicator for cleaning in narrow spacess and/or printed ciruit boards.

5.4 CALIBRATION

The only thing that can be calibrated in the 5900 frame is the switching power supply. The power supply is calibrated at the factory to insure optimum performance. However, calibration may be required due to component aging or whenever the supply is replaced. This section describes and illustrates the procedures necessary to calibrate this supply. Calibration should be performed by qualified personnel only. The only equipment needed is a volt meter.

The following procedure with the help of Figure 5-1 details the calibration of the power supply.

a. Turn the power to the 5900 frame off.

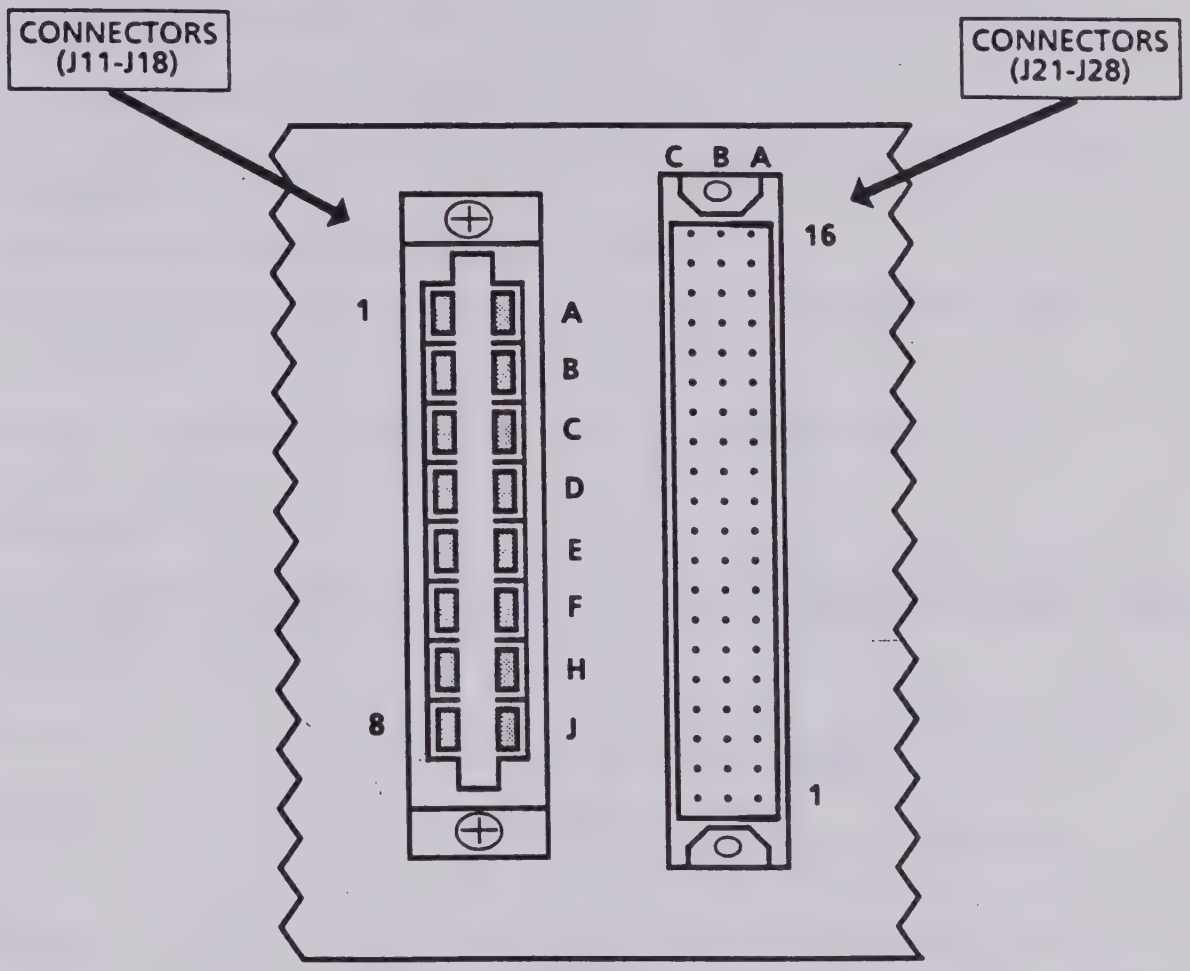
b. Remove top-rear cover (see Section 2.8 for details)

c. Disconnect J76

d. Connect the negative lead of the volt meter to pin 6 of connecter J76.

e. Connect the positive lead of the meter to pin 2 of connecter J76.

FIGURE 5-2
MOTHER BOARD



PIN OUTS - (J11-J18)

PIN	ASSIGNMENT	PIN	ASSIGNMENT
1	Power Common	A	Aux. A
2	Signal Output	B	Aux. B
3	-15 VDC	C	Aux. C
4	+ 15 VDC	D	Aux. D
5	Signal Common	E	Aux. E
6	N/C	F	Aux. F
7	13 VAC	H	Aux. H
8	13 VAC	J	Aux. J

PIN OUTS - (J21-J28)

PIN	ROW A	ROW B	ROW C
1	Data 0	Data 8	N/C
2	Data 1	Data 9	N/C
3	Data 2	Data 10	Slot 0
4	Data 3	Data 11	Slot 1
5	Data 4	Data 12	Slot 2
6	Data 5	Data 13	Slot 3
7	Data 6	Data 14	CDIN
8	Data 7	Data 15	CDOUT
9	R/W	N/C	Notify
10	N/C	N/C	Sync Clock
11	N/C	MReset	MSync
12	N/C	Data Req	Data Ack
13	N/C	Common	Common
14	N/C	+ 5 VDC	+ 5VDC
15	N/C	Common	Common
16	N/C	Chassis	Chassis

f. Turn the power to the 5900 frame on. Wait 1 minute for warm up time.

g. The meter should read +5 VDC +/- 4%. If you do not read this, adjust trim pot #1.

h. Move the positive lead of the meter to pin 9.

i. The meter should read +15 VDC +/- 4%. If you do not read this, adjust trim pot #2.

j. Move the positive lead of the meter to pin 14.

k. The meter should read -15 VDC +/- 4%. If you do not read this, adjust trim pot #3.

Calibration is completed. Turn off the power and reconnect J76.

5.5 TROUBLESHOUTING

This section contains dignostic information in the event your 5900 is not working correctly (refer to schematic diagrams CL-211476,297582 and 297581, and pin outs described in Section II and Figure 5-2 for help).

Symptom #1: ..... 5900 not working at all (front panel led is off and fan is not running).

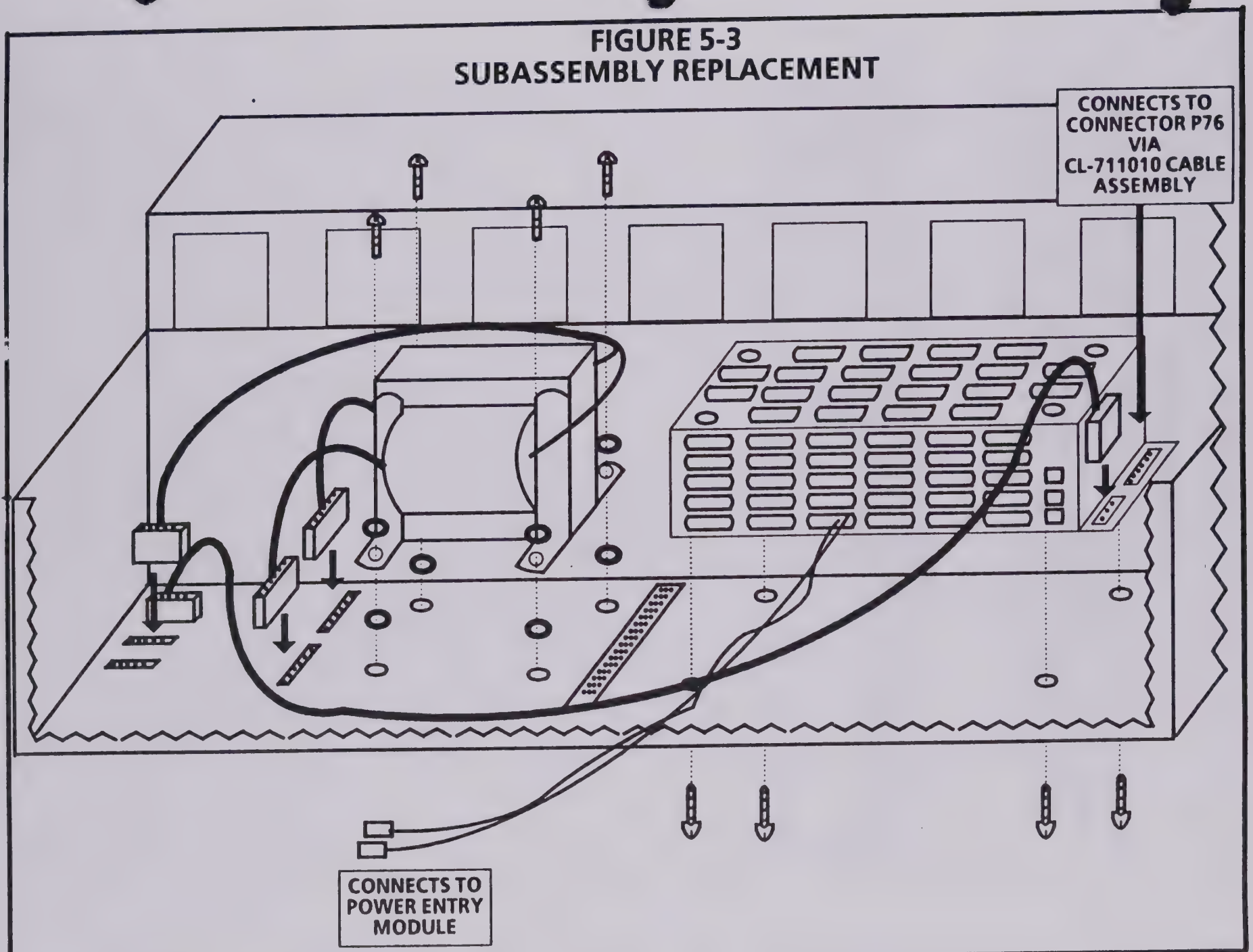
Condition: ..... (1) Line fuse is blown.
(2) Switching power supply is defective.

Procedure: ..... (1) Check line fuse (see Section 5.2 for details.
(2) Check to see if the line voltage is going to the suppy and DC (+5,+15,-15 VDC) is leaving the supply.

Symptom #2: ..... LED light is on and fan is running. However, Amplifiers not working properly.

Condition: ..... (1) Defective amplifiers.
(2) Amplifiers are not receiving DC input voltage.
(3) Amplifiers (if applicable) are not receiving 13 VAC input.
(4) Faulty connection between amplifier's output and frame's output connectors (BNC, recorder interface or Medical Output connectors).

FIGURE 5-3
SUBASSEMBLY REPLACEMENT



APPENDIX A

SCHEMATIC DRAWINGS

This section contains complete schematic drawings for this Gould product. The following schematics were of the latest revision at time of printing. The schematics are arranged in numerical order by drawing number. All documenents included in the section are listed below, in alphanumeric order by title, along with their drawing numbers to help located them. The part umber of any PC board assembly may be obtained by replacing the initial "2" in the schematic number with an "8".

ALPHABETICAL LIST OF SCHEMATICS

DESCRIPTION OF ASSEMBLY	SCHEMATIC DRAWING NUMBER	REVISION LEVEL
DISTRIBUTION BOARD	297582	C
MOTHER BOARD	297581	B
SYSTEM BLOCK DIAGRAM	CL-211476	

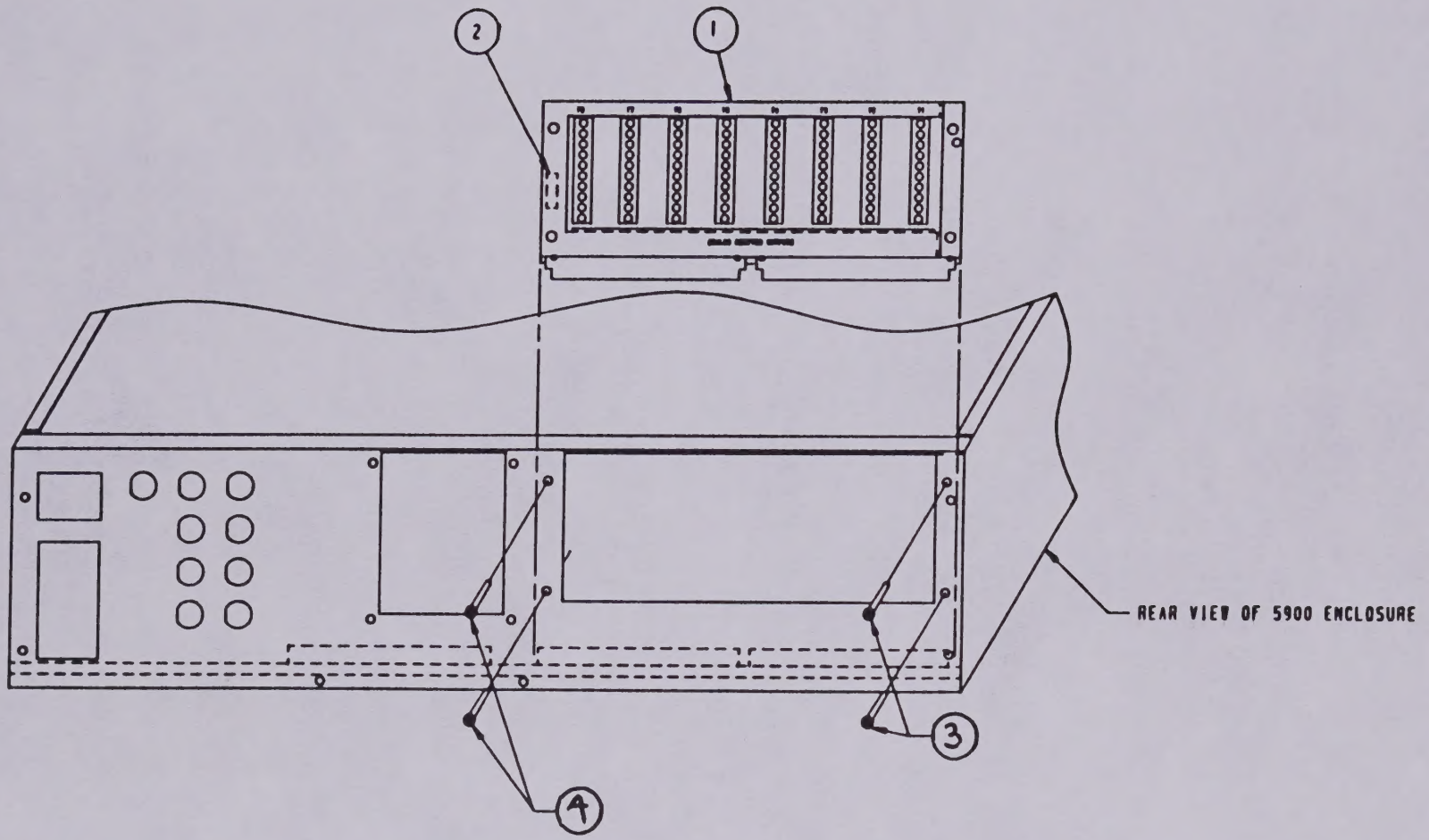
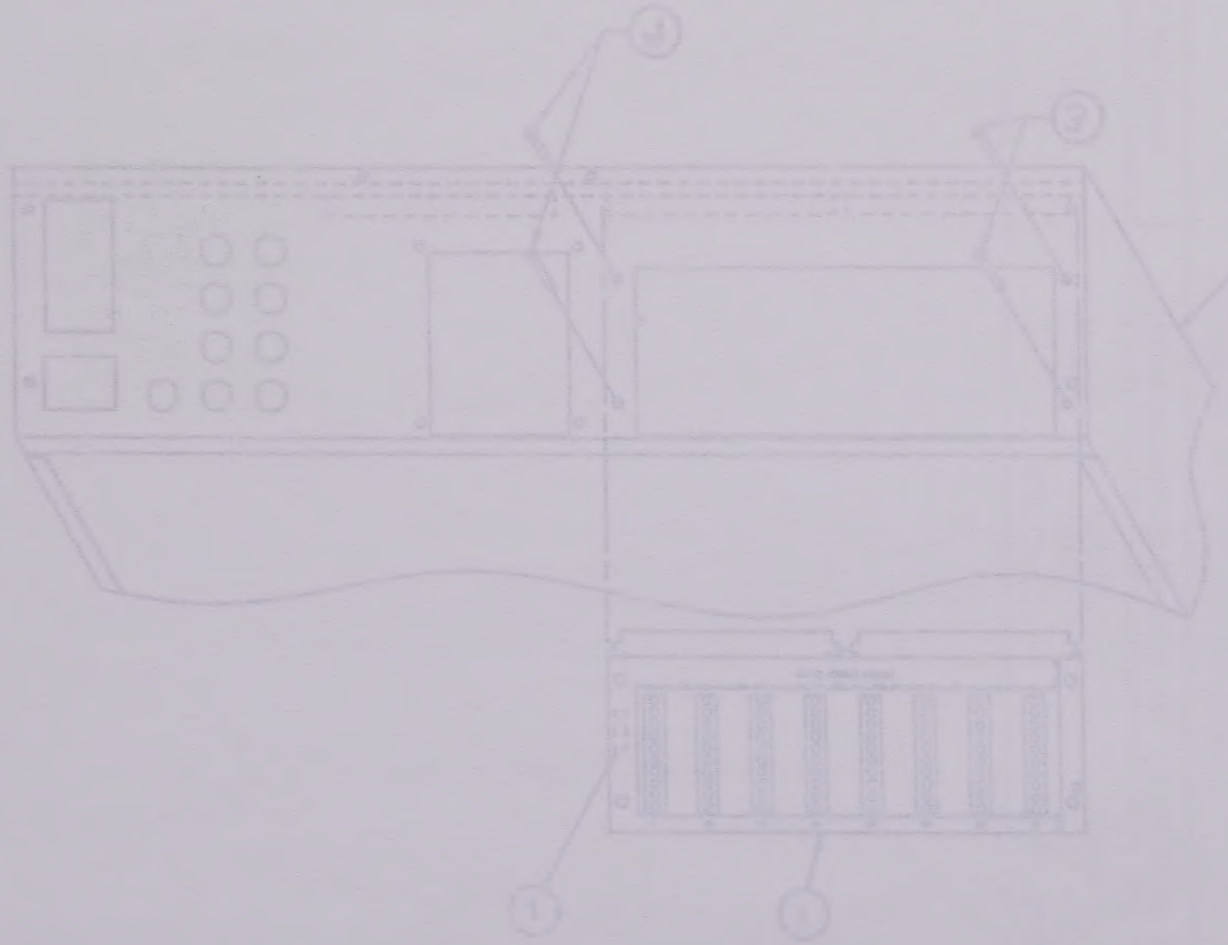


FIGURE 6 - 8 MEDICAL BOARD KIT



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